Single N-channel MOSFET

ELM33412CA-S

■General description

ELM33412CA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate resistance.

■Features

- Vds=20V
- Id=6A
- Rds(on) < 24mΩ (Vgs=4.5V)
- Rds(on) < 32mΩ (Vgs=2.5V)
- Rds(on) < 50mΩ (Vgs=1.8V)

■Maximum absolute ratings

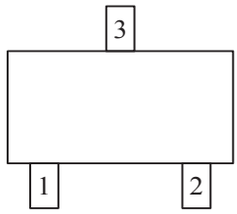
Parameter		Symbol	Limit	Unit	Note
Gate-source voltage		Vgs	±8	V	
Continuous drain current	Ta=25°C	Id	6	A	
	Ta=70°C		5		
Pulsed drain current		Idm	25	A	3
Avalanche current		Ias	21	A	
Avalanche energy	L=0.1mH	Eas	22	mJ	
Power dissipation	Ta=25°C	Pd	1.0	W	
	Ta=70°C		0.6		
Junction and storage temperature range		Tj, Tstg	-55 to 150	°C	

■Thermal characteristics

Parameter		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient		Rθja		130	°C/W	

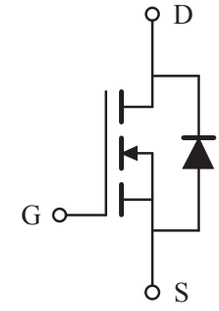
■Pin configuration

SOT-23(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

■Circuit



■Electrical characteristics

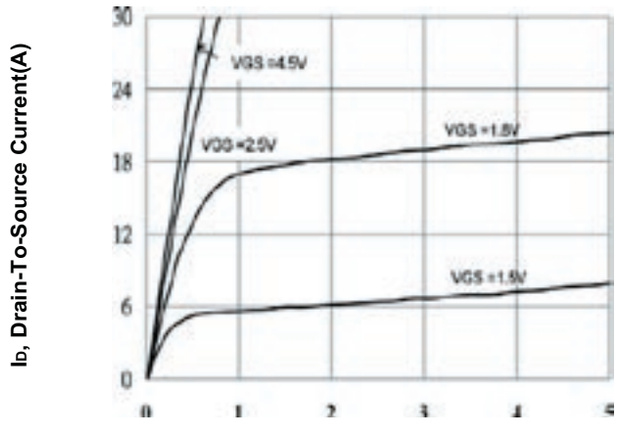
Ta=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	20			V	
Zero gate voltage drain current	Idss	Vds=16V, Vgs=0V			1	μA	
		Vds=10V, Vgs=0V, Tj=70°C			10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±8V			±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	0.5	0.8	1.0	V	
On state drain current	Id(on)	Vgs=4.5V, Vds=10V	30			A	1
Static drain-source on-resistance	Rds(on)	Vgs=4.5V, Id=6A		18	24	mΩ	1
		Vgs=2.5V, Id=5A		21	32		
		Vgs=1.8V, Id=4A		29	50		
Forward transconductance	Gfs	Vds=5V, Id=6A		9		S	1
Diode forward voltage	Vsd	If=6A, Vgs=0V			1	V	1
Max. body-diode continuous current	Is				1.4	A	
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=10V, f=1MHz		1030		pF	
Output capacitance	Coss			176		pF	
Reverse transfer capacitance	Crss			126		pF	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=4.5V, Vds=10V, Id=6A		13.2		nC	2
Gate-source charge	Qgs			2.0		nC	2
Gate-drain charge	Qgd			4.0		nC	2
Turn-on delay time	td(on)	Vgs=4.5V, Vds=10V, Id≈6A Rgen=6Ω		7		ns	2
Turn-on rise time	tr			13		ns	2
Turn-off delay time	td(off)			52		ns	2
Turn-off fall time	tf			16		ns	2
Body diode reverse recovery time	trr	If=6A, dl/dt=100A/μs		14.1		ns	
Body diode reverse recovery charge	Qrr			4.0		nC	

NOTE :
1. Pulse test : Pulsed width ≤ 300μsec and Duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulsed width limited by maximum junction temperature.
4. Duty cycle ≤ 1%.

■Typical electrical and thermal characteristics

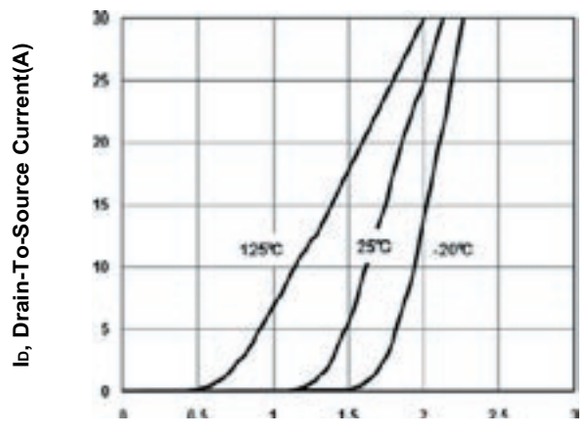
Output Characteristics



I_D, Drain-To-Source Current(A)

V_{DS}, Drain-To-Source Voltage(V)

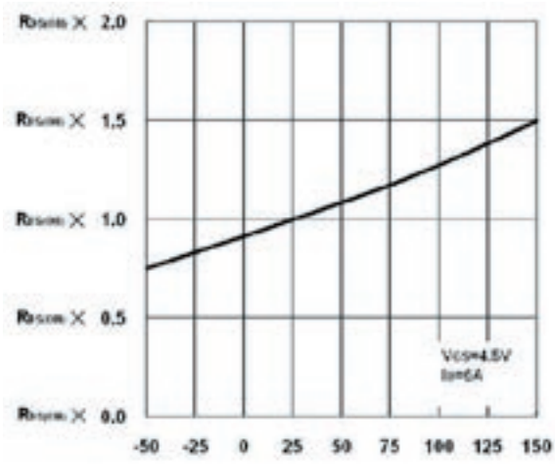
Transfer Characteristics



I_D, Drain-To-Source Current(A)

V_{GS}, Gate-To-Source Voltage(V)

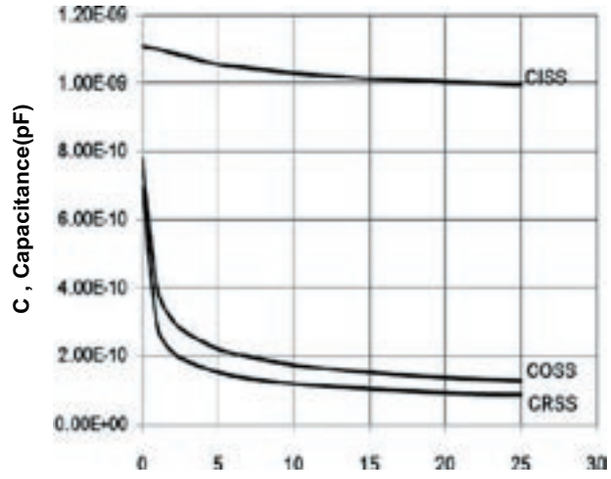
On-Resistance VS Temperature



$R_{DS(ON)}$ON-Resistance(OHM)

T_J , Junction Temperature(˚C)

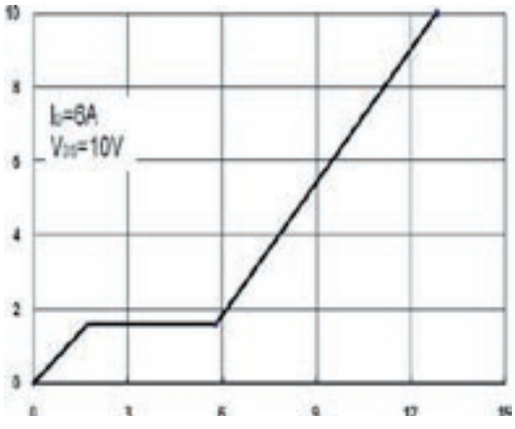
Capacitance Characteristic



C , Capacitance(pF)

V_{DS}, Drain-To-Source Voltage(V)

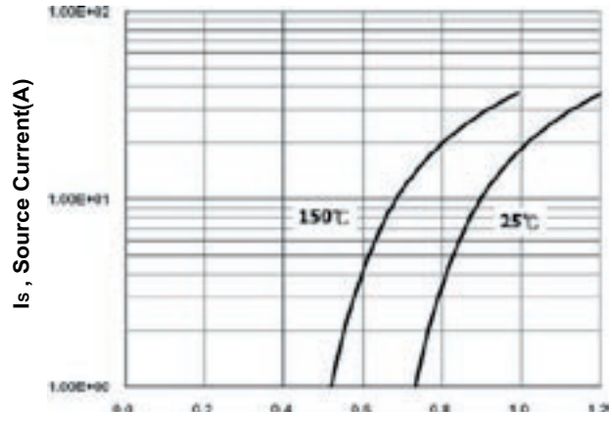
Gate charge Characteristics



V_{GS} , Gate-To-Source Voltage(V)

Qg , Total Gate Charge(nC)

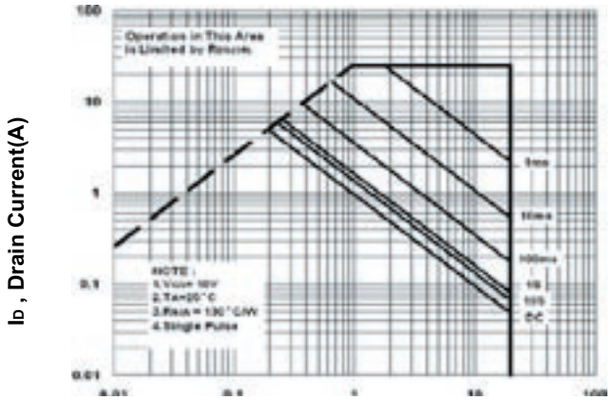
Source-Drain Diode Forward Voltage



I_S , Source Current(A)

V_{SD}, Source-To-Drain Voltage(V)

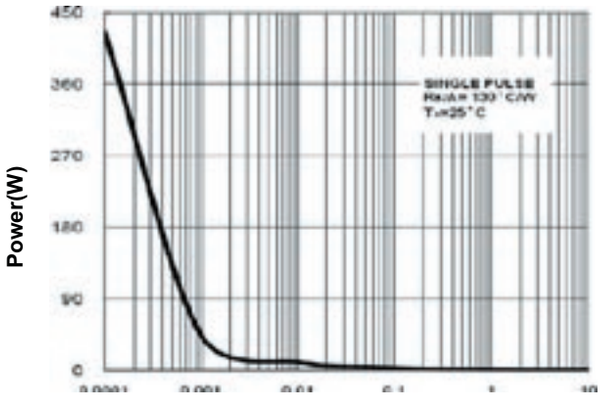
Safe Operating Area



I_D , Drain Current(A)

V_{DS}, Drain-To-Source Voltage(V)

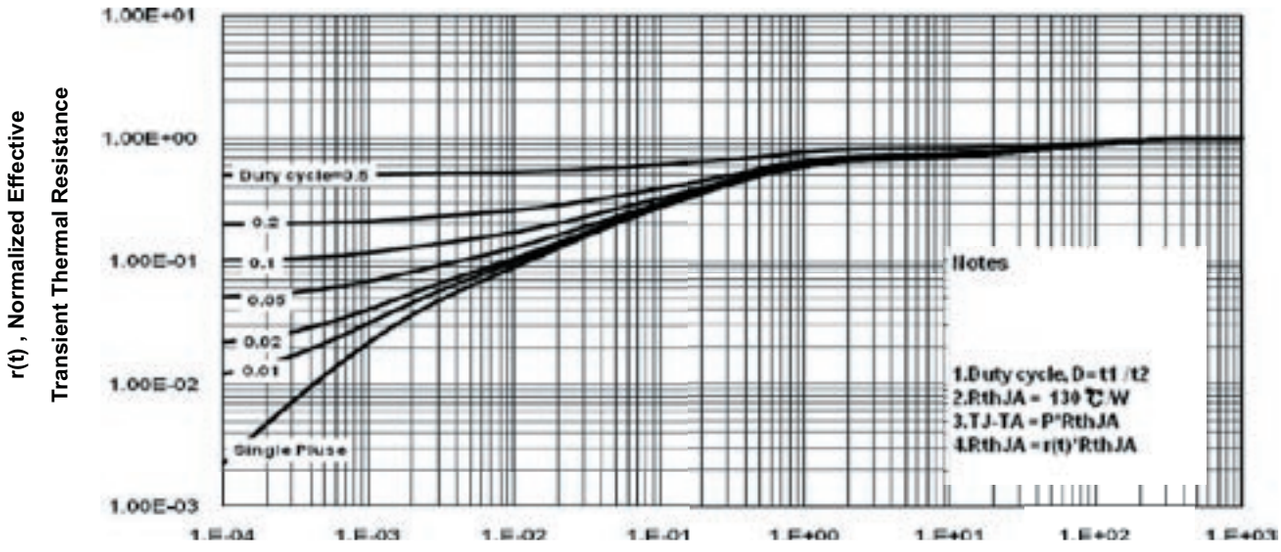
Single Pulse Maximum Power Dissipation



Power(W)

Single Pulse Time(s)

Transient Thermal Response Curve



r(t) , Normalized Effective Transient Thermal Resistance

T_1 , Square Wave Pulse Duration[sec]